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Chapter 5

The Anthropic Pressure on the Landscapes of the Subcarpathian and Piedmont Basin of Dâmbovița River (Romania)

Mihaela Sencovici and Gica Pehoiu

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/63722

Abstract

The Subcarpathian and Piedmont Basin of Dâmboviţa cover an area of 412 km^2 and largely overlap north-western part of Dâmboviţa County, namely the relief units: Gethian Subcarpathians (the Subcarpahians of Argeş), Subcarpathians of Curvature (the Subcarpathians of Ialomiţa) and Getian Plateau (Piedmont of Cândeşti).

Geographic landscape in the area under analysis is closely correlated to ample, complex activities, and to various effects, depending on concrete local conditions, and all these open a large observation field for geographic research.

In the studied area, in time, in the structure and geographic repartition of the categories of land uses, different changes have intervened, especially related to diverse geomorphological processes, the deforestation of some forest areas and the extension of built areas.

Administratively, the Subcarpathian and Piedmont Basin of Dâmboviţa correspond to the territory of 11 communes. The relief, by its morphographic, morphometric, morphogenetic and morphodynamic features, presenting both favorable and unfavorable aspects, represent one of the factors of geographic environment influencing the characteristics of human habitat, and also conditioning the geographic area occupied by human settlements and their features. By using the lands according to his various interests, man has modified more or less intensely the composition and structure of vegetal cover, which influenced the hydrological regime, present modeling processes, quality of the soil, etc., leading to general changes in the structure of geographic landscape.

Keywords: environment, landscape, anthropic influence, subcarpathian unit, land use, vegetation

1. Introduction

The area under analysis corresponds to the Subcarpathian and Piedmont Basin of Dâmboviţa.

In point of its geographic limits, the delimitation between the Subcarpathian and Piedmont Basin of Dâmboviţa and the neighboring geographic units goes through the following altimetric levels:

In the north, the last alpine peaks of Leaota dominate Subcarpathian hills; the delimitation between the two sectors occurs along the alignment of communes Cetăţeni and Pucheni, the limit going through the following summits: Groapa Oii (950 m), Vârful lui Tică (950 m) and Plaiul Găvanei (1250 m). It neighbors Basin of Argeş in western part, the limit being realized by the hills: La Poşta Veche (716 m), Vârtop (790 m), Malu Corbului (795 m), Perilor (744 m), Istrate (660 m) and Tâmpa (522 m).

Figure 1. Geographic limits of the Subcarpathian and Piedmont Basin of Dâmboviţa.

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In the east, the watershed separating basin of Dâmboviţa from basin of Ialomiţa goes through the following peaks: Gâlma Brebu (867 m), Puţul lui Bondoc (780 m), Vârful Giurcului (840 m), Culmea Stălpu (652 m), Culmea Mălaiştea (608 m), Vârful Stânii (692 m), Culmea Moga Înaltă (584 m) and La Cruce (511 m). In the south, from Dragomireşti, where Dâmboviţa enters the plain, the hill margin goes around the top of a terrace (t3), which vanishes away near the locality of Priseaca. The limit is given by the peak Coada Butoiului (419 m) and the forest Floreasca (355 m)—**Figure 1**.

As topography and morphohydrography, the basin evolves into an elongated form from north to south, being larger in the north, where it receives two important tributaries, namely Râu Alb and Valea Largă, while southwards it is narrower, being part of the plain sector (at Dragomireşti). The hilly area of Dâmboviţa is a region where fruit trees are grown. The Fruit Tree Station of Voineşti, created in 1950, polarized the whole valley beginning from Cetăţeni up to Dragomireşti, the area being crossed by just one national road, DN 72 A, connecting Târgovişte Town to Câmpulung.

The relief represents one of the factors of the geographic environment influencing the features of human habitat [1]. By its morphographic, morphometric, morphogenetic and morphodynamic features, highlighting both favorable and restrictive aspects, the relief conditions the geographic area occupied by human settlements and their features. The hilly basin of Dâmboviţa covers an area of 412 km^2 and is represented both by Subcarpathian Hills and Piedmont Hills. This situation is due to the fact that while on the left side Dâmboviţa passes from the alpine zone to the plain area by means of Subcarpathians, on the right side, in-between Subcarpathians and the plain, lies the Getic Piedmont.

2. Methodology

In the present analysis, we have taken into account the value of human pressure by the way lands are used in agriculture, which represents a synthetic indicator allowing to appreciate the intensity of the impact of anthropic activity on the environment, bringing to light the degree of artificialization of vegetal cover in the area under analysis. Although it is an indicator that is frequently used, its value being quite relative, because pressure is differentiated also depending on the inhabitants' occupations and on the type of agriculture practiced (intensive or subsistence). The formula applied by FAO for the calculation of this indicator is:

$$P = \frac{S(\text{ha})}{N(\text{inh.})}$$

where: P = human pressure; S = area under analysis; N = number of inhabitants in the area under analysis.

Using this formula, we have calculated the human pressure on the environment using various agricultural land uses, namely: arable, pastures, hayfields, vineyards, orchards, for the year

2014, based on data provided by the Romanian National Statistics Institute. Statistical data used in this analysis are on the level of each commune and it is hard to differentiate them for the communes which have only a part of their territory in the area analyzed.

3. Human pressure on the natural landscapes

In time, relation between man and the environment has changed deeply both in the area of Subcarpathian and Piedmont Basin of Dâmboviţa and nationally [2].

The influence of human activity on the environment is particularly complex and has various effects. From simple anthropic activities: plant cultivation, animal breeding, wood exploitation, up to the complex ones: oil exploitation, mining, extraction of building materials, along with tourism, arrangement of the infrastructure and increase of constructible fund, all these bring changes concerning natural landscapes [3].

Man, by the totality of his activities, has intervened on the environment even since the oldest times, until now, triggering major changes in the landscape [4].

Demographic growth has led to a significantly increased consumption of natural resources, while economic, social and technical development has led to the appearance of more and more efficient means and techniques of exploration, exploitation and transformation of the raw matters. The last decennia, on the background of a growing consumption, have been characterized by a high level of energy and raw matters use, and storage of wastes coming from a production meant to face a continually larger and diversified demand.

In the anthropized ecosystems, man has deteriorated the biological processes, ignoring the law of self-regulations in the biosphere. Such situations have affected relation between man and nature, and the aggressiveness that man has expressed by his relation to the environment has gradually turned against himself [5].

3.1. Human pressure on the land used in agriculture

The use of geographic area depends on how favorable natural factors are, on the productive potential of land and on improvement works. Agricultural zone represents the terrestrial area exploited by the cultivation of plants, this being an important component of rural area and having certain limits imposed by relief and pedoclimatic conditions.

At the present, agricultural area of the Subcarpathian and Piedmont Basin of Dâmboviţa is of 20,961 ha and represents 48.70% of total area of the basin of 43,045 ha (**Figure 2**). On the level of administrative units, the situation is as follows:

By diverse anthropic activities undertaken in the agricultural area, man has brought structural changes in the natural vegetation. From deforestations undertaken to increase the agricultural area up to changes in the makeup of the vegetal cover, through the use of lands for different agricultural cultures, natural landscapes have been submitted to a continual

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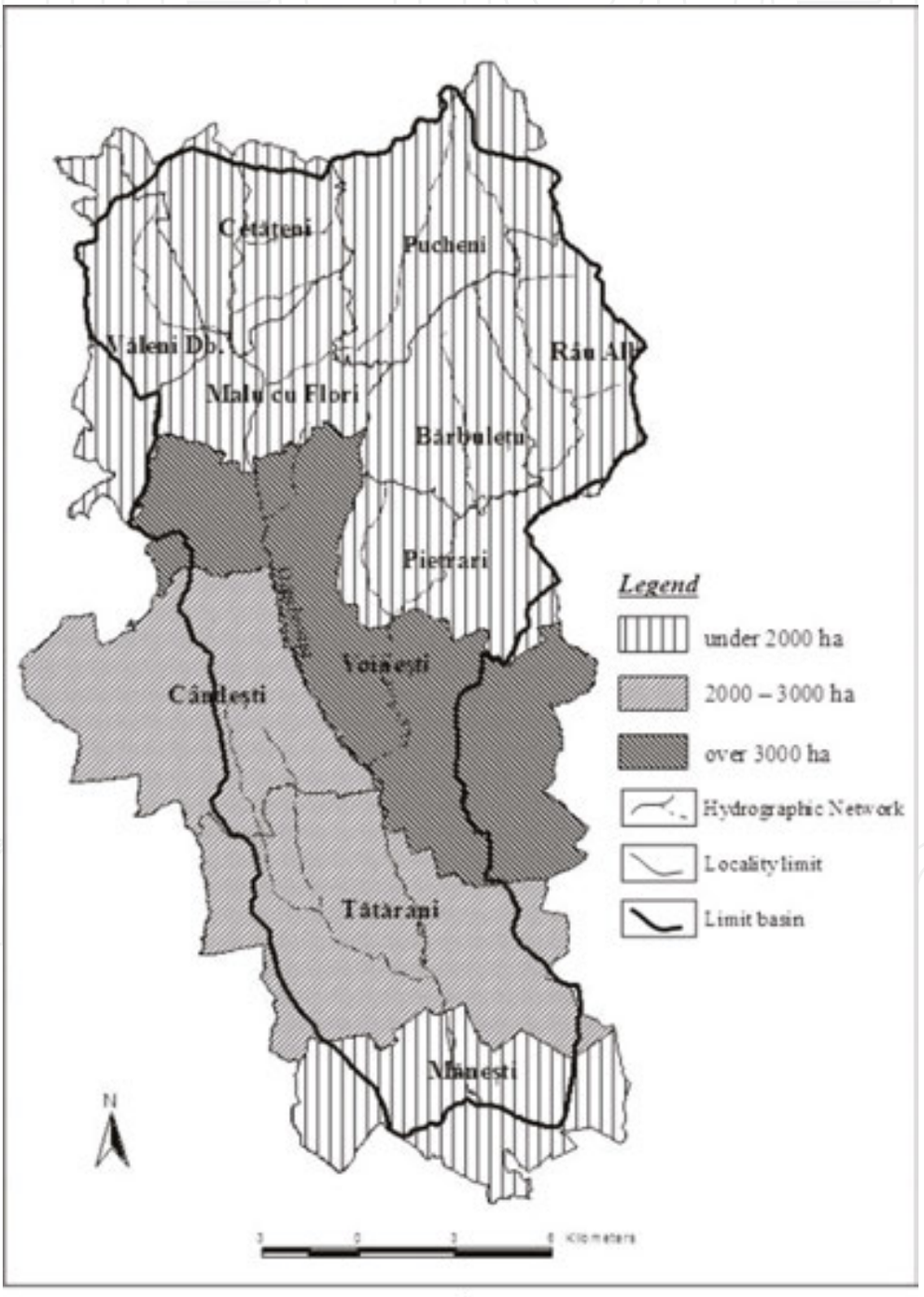
anthropic pressure. The value of anthropic pressure, following the use of lands for agricultural activities, represents an indicator allowing a concise appreciation of the impact of human activity on the environment, highlighting in this way the artificialization degree of vegetal cover in the analyzed area [6].



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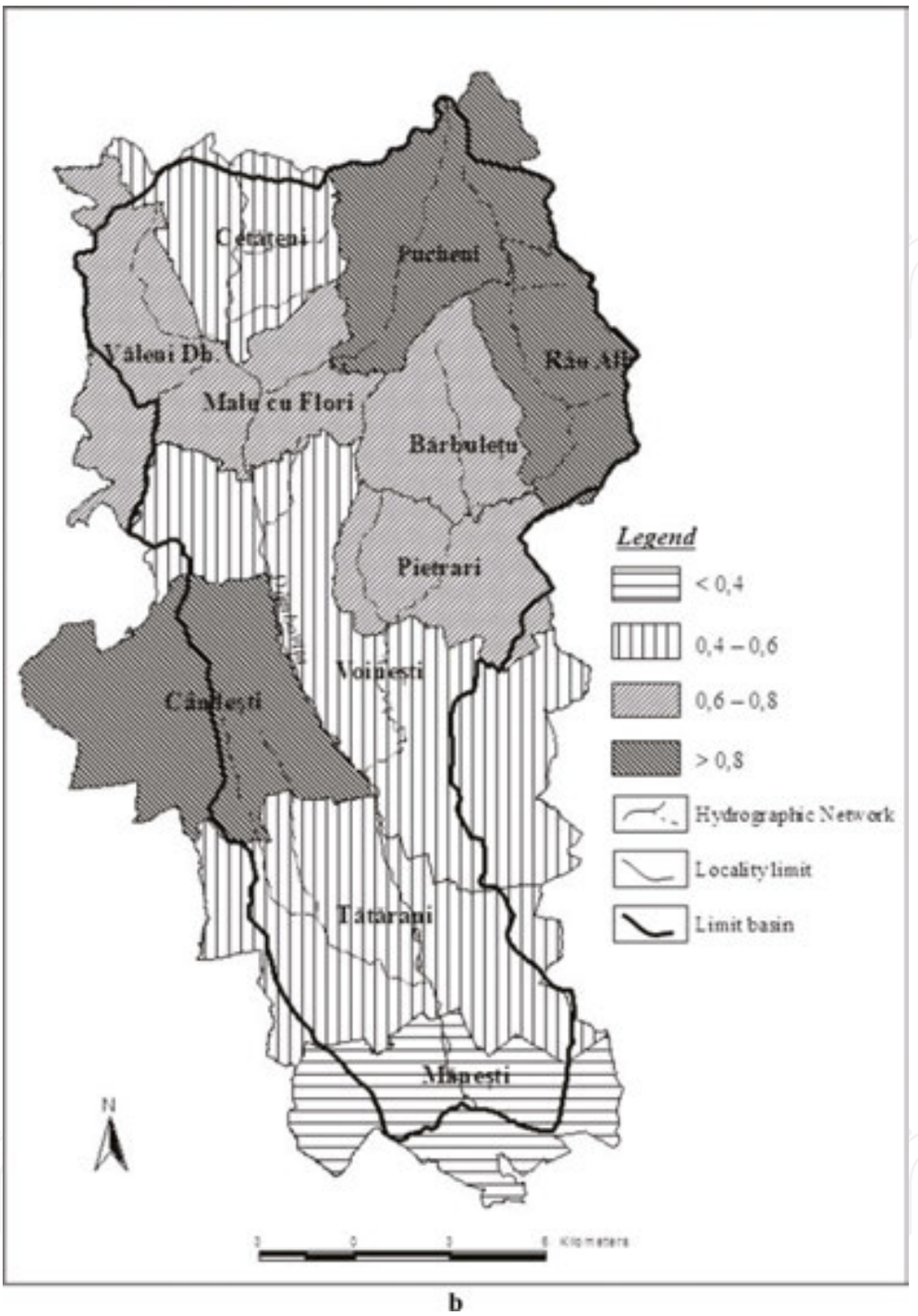

b

Figure 2. (a, b) Agricultural area and human pressure through the agricultural area on the level of administrative units.

The value of this indicator is quite relative, because pressure is differentiated depending on the type of agriculture practiced (intensive or subsistence) [7]. Using the formula applied by FAO for the calculation of this indicator, we have calculated human pressure on the environment through agricultural use of the lands, for the year 2013 based on data provided by National Statistics Institute.

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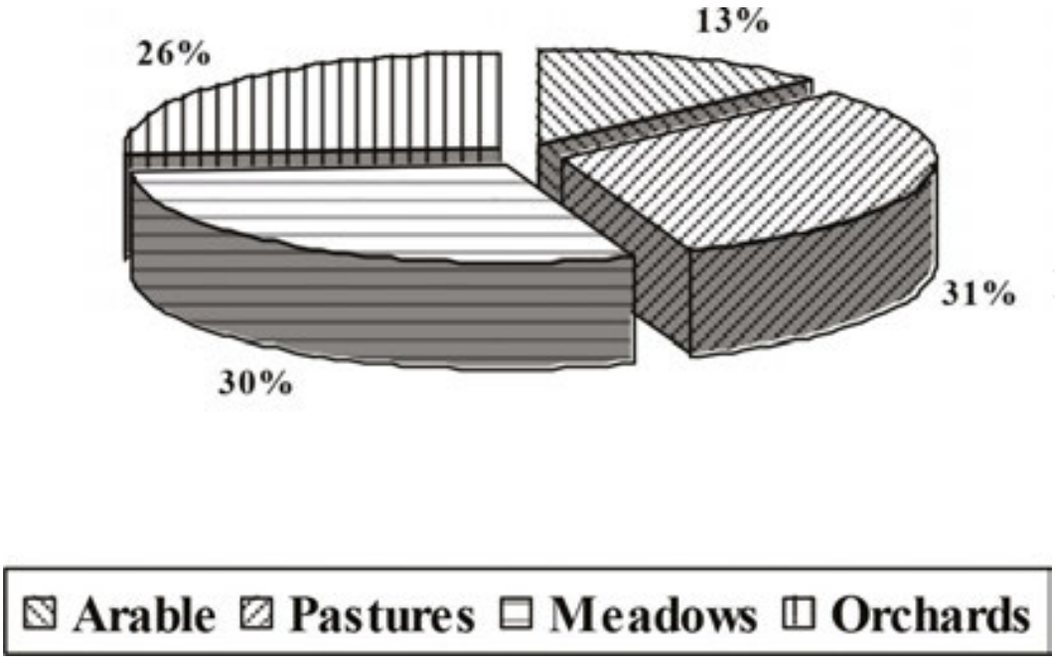


Figure 3. Structure of the agricultural fund—percentage.

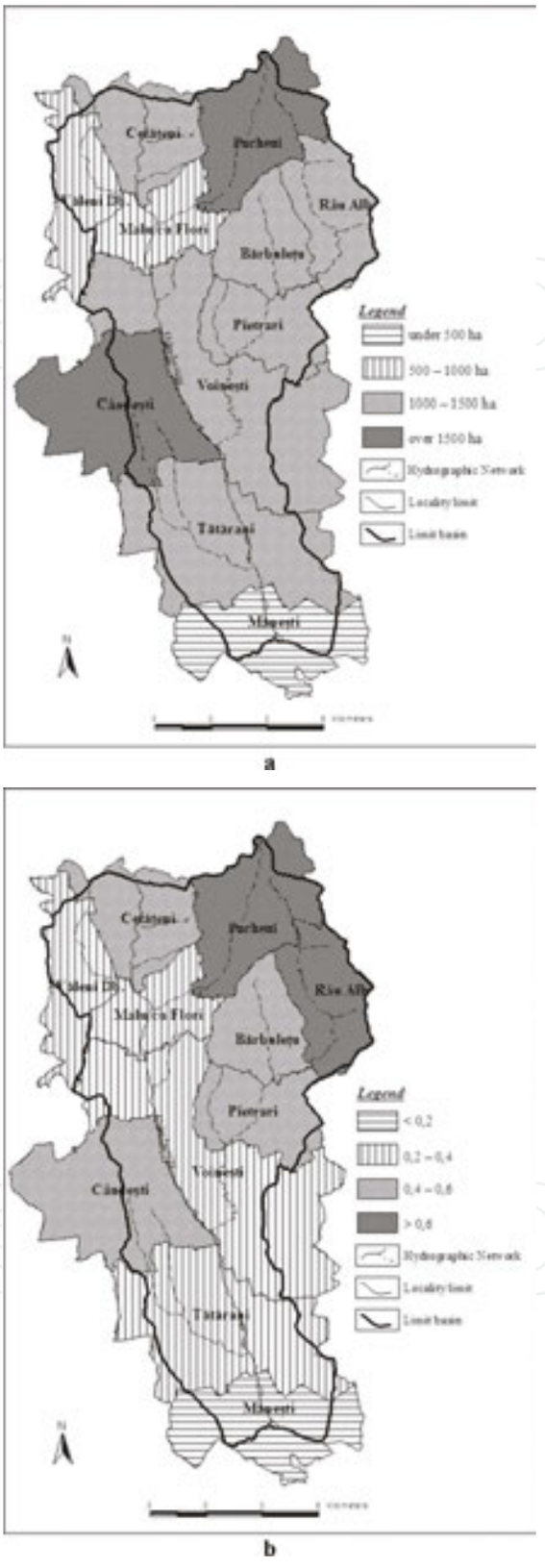
The human pressure on the environment was calculated taking into account agricultural area of the zone under analysis divided into administrative-territorial units of the third degree—communes. On the whole, on agricultural landscape in the Subcarpathian and Piedmont Basin of Dâmboviţa, a pressure of 0.68 is exerted. On the administrative level, the highest values of human pressure index correspond to the localities: Râu Alb (1.13 ha/inh.), Pucheni (0.97 ha/inh.) and Cândeşti (0.81 ha/inh.). At the opposite pole, with lowest values of the anthropic pressure, we find the localities: Măneşti (0.24 ha/inh.), Tătărani (0.41 ha/inh.)—**Figure 2**.

In the agricultural area of Subcarpathian and Piedmont Basin of Dâmboviţa, largest sectors are those corresponding to pastures, hayfields and orchards, and to a lower extent, arable zones (**Figure 3**).

3.2. Human pressure on the environment by means of pastures and hayfields

Area corresponding to the zone of pastures and hayfields is 12,825 ha and represents 61.18% of arable area in the zone under analysis, namely 29.79% of the total area. Administratively, largest areas meant for pastures and hayfields are in the localities Cândeşti (1667 ha), Pucheni (1522 ha), and smallest areas belong to the localities Măneşti (351 ha) and Malu cu Flori (678 ha).

The highest values of the index of human pressure on the environment by means of pastures and hayfields correspond to the localities: Râu Alb (0.88 ha/inh.), Pucheni (0.81 ha/inh.), and the lowest values to Măneşti (0.06 ha/inh.), Tătărani (0.22 ha/inh.) while the average pressure on the Subcarpathian and Piedmont Basin of Dâmboviţa is of 0.36 (**Figure 4**).



a

b

Figure 4. Area of pastures and hayfields (a) and human pressure exerted through them on the level of administrative units (b).

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Concretely, areas meant for pastures have undergone pressures of an excessive grazing that triggered the continual degradation of the quality of vegetal cover. A part of the areas corresponding to pastures overlap riverside valley of Dâmbovița River. Here, following the excessive grazing, a large part of the lawns of *Fetusca valesianca* have turned into lawns of *Poa bulbosa* and *Cynodon dactylon* (**Photo 1**).

For hayfield area, the main type of anthropic pressure is using of chemical fertilizers to increase the quality of the herbaceous cover; consequently, a part of natural vegetal formations and a part of flora were strongly affected.

Photo 1. Grazing in the river meadow of Dâmbovița (Măneşti), excessive grazing (Gheboieni).

Photo 2. Excessive grazing (Râu Alb).

The degradation of vegetal cover appears in the moment when area of the respective land is overused through daily grazing; such areas can be met in the communes Râu Alb, Pucheni, Cetăţeni and also in some parts of the riverside of Dâmboviţa and of its tributaries (**Photo 2**).

3.3. Human pressure on the environment by means of orchards

Presence of the Fruit Tree Station Voineşti has supported whole zone by means of a strong development of fruit-tree growing sector. So, after the areas occupied by pastures and hayfields, those occupied by fruit trees hold a considerable percentage, more exactly 25.88% of the agricultural area, i.e. 5340 ha. Largest fruit tree areas belong to the localities: Voineşti (1300 ha), Văleni Dâmboviţa (840 ha), Malu cu Flori (769 ha), and smallest areas can be found in the localities Tătărani (162 ha) and Cetăţeni (173 ha)—**Figure 5**.

The human pressure exerted by areas occupied by orchards on whole area of the basin is of 0.15 ha/inh. On the administrative level, localities with a high index of the anthropic pressure are: Malu cu Flori (0.33 ha/inh.), Văleni Dâmboviţa (0.31 ha/inh.), the lowest index is that of the localities Tătărani (0.03 ha/inh.), Cetăţeni (0.05 ha/inh.) and Măneşti (0.07 ha/inh.)—**Figure 5**.

During last few years, by accessing European funds, a part of the traditional and of intensive fruit-tree areas have been replaced by superintensive ones (**Photo 3**).

Photo 3. Superintensive orchards with drop by drop irrigation systems (Voineşti).

Having a superior production level, their maintenance is also different, superintensive fruit-tree areas exerting a much higher pressure on the environment, compared to traditional ones. The main form of pressure on the natural environment is represented by use of large quantities of chemicals, especially in areas occupied by apple trees. Approximately 70% of all orchards correspond to areas occupied by apple trees and pear trees, about 4000 ha. For just

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1 ha of apple trees are used, on average: 20 g insecticide, 40 g fungicide and 1000 l water for just one hygienization treatment. Consequently, if, on average, depending on the meteorological conditions, 15 treatments/year are needed, referring to the area of 1 ha, we can notice a consumption of water of 15,000 l. For just one agricultural year, fruit tree area (apple and pear trees) of the Subcarpathian and Piedmont Basin of Dâmboviţa requires 60,000,000 l water (60,000 tons of water).

Because of the lack of collaboration between orchard owners, there has occurred a situation in which hygienization treatments came to be repeated even every 4 days, whereas the period recommended is 7 days. Quite often, orchards had to suffer following intoxications with chemicals.

Differences between the superintensive and traditional and even intensive plantations, regarding to the degradation of vegetal cover, are significant. In superintensive plantations, with drop by drop irrigation systems, vegetal cover is almost totally missing, because of plowing works, combined with the use of herbicides (Photo 3).

At the actual rhythm, a part of fruit tree area of the localities situated in the riverside of Dâmboviţa (Voineşti, Cândeşti, Malu cu Flori) shall be occupied by superintensive orchards, changing well-known landscape offered by traditional and intensive orchards. The localities with more significant fruit tree areas, yet having no flat land, but situated on slopes, will preserve their aspect, at least in short and medium term, due to difficult installation of a drop by drop irrigation system (**Photo 4**).

Photo 4. Traditional apple orchard: 1. Pietrari, 2. Plum orchard (Bărbuleţu).

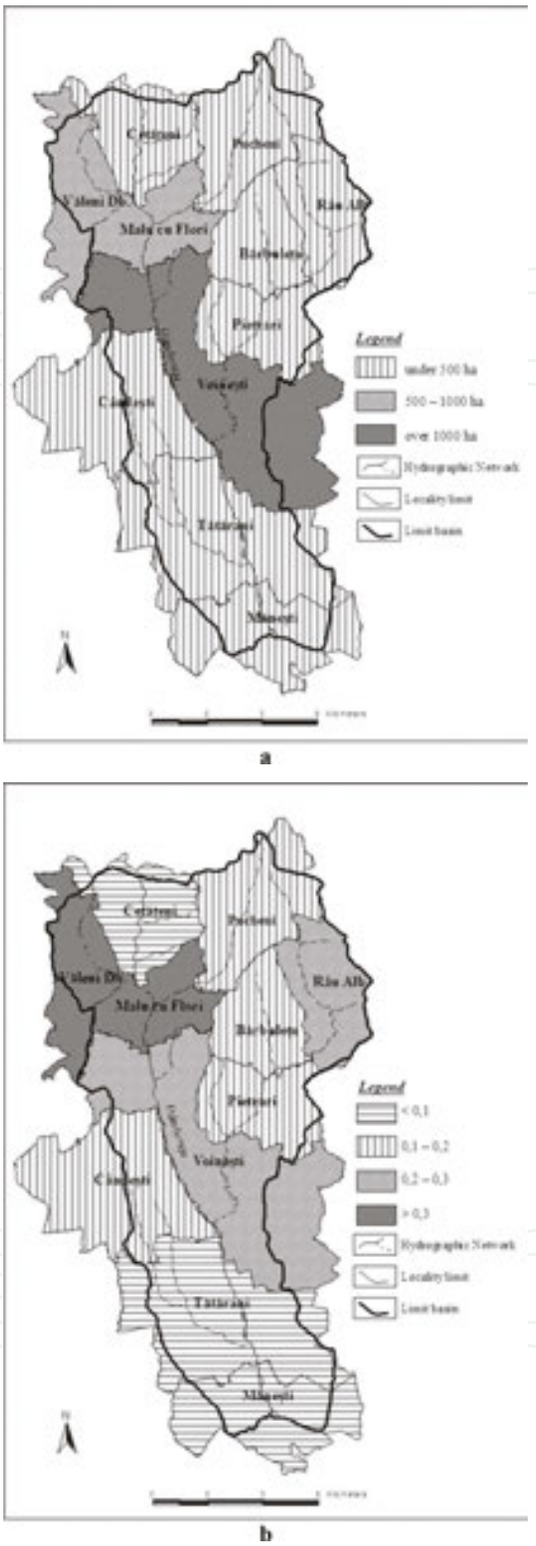

Figure 5. Area occupied by orchards (a) and human pressure (b) exerted by means of orchards on the level of administrative units.

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3.4. Human pressure on the forest areas

Out of all land ecosystems, forests represent a special category, given the raw matters they provide, natural possibilities of regeneration and multiple services having a protective character. Forest represents a favorable environment of life for different species of plants and animals, having a significant hygienic-sanitary role, exerting important beneficial influences on climate and soil, and it is an important tourist element.

In fact, it influences the climatic regime through the improvement of most climate factors, such as temperature, radiations, precipitations, evaporation, air humidity, evapotranspiration, wind, turning the forest into a unique environment. Forest has an important role in cleaning, purification of the atmosphere, by means of photosynthesis process, by massiveness of its rich foliage, having the characteristic feature of freeing a large quantity of oxygen, absorbing carbon dioxide, and retaining vapors and toxic gases, dusts and sound waves [8].

All these functions are part of the category of protective functions of the environment (soil, waters, climate, and ambient atmosphere), having rather indirect influences on the human society. Forest also has numerous direct influences, by its social protection functions: recreational, esthetic and landscape function or as an object of study due to the large quantity of scientific information it can provide. It should be noted that forest is the ecosystem assuring most complex and stable protective balance for natural environment. It realizes ideal connections between flora, soil and climate, developing tall and long-lasting trees with an important ecological function which determines a network of compensations and self-regulations in the biosphere.

Yet, of all terrestrial ecosystems, most deteriorated have been forest ecosystems, following destructive actions undertaken by man, both by turning to good use the raw matters and by replacing them with other, less enduring, ecosystems. A part of the forest area has been deforested to enlarge agricultural and constructible areas, and on the other hand, another part has been degraded through abusive exploitations, fires, permanent grazing, pollution [5].

At the present, forest area of the Subcarpathian and Piedmont zone of Dâmboviţa covers 19,436 ha and represents 45.15% of the area of this basin. It is made up of numerous deciduous species: *Fagus silvatica*, *Carpinus betulus*, *Fraxinus excelsior*, *Sorbus terminalis*, *Quercus patraea*, *Acer platanoides*, *Acer capestris*, *Ulmus procera*, *Tilia platyphylos*, *Quercus robur*, *Quercus cerris* which cover Subcarpathian Hills and the Piedmont, along with *Alunus glutinosa*, *Populus alba*, *Populus nigra*, *Salix fragilis* developed in the river plains of Dâmboviţa and its tributaries.

From an administrative perspective, largest forest areas are in the communes: Voineşti (4362 ha), Tătărani (3926 ha), Cândeşti (2735 ha), and the smallest in the communes Malu cu Flori (415 ha), Văleni Dâmboviţa (683 ha) and Râu Alb (723 ha)—**Figure 6**.

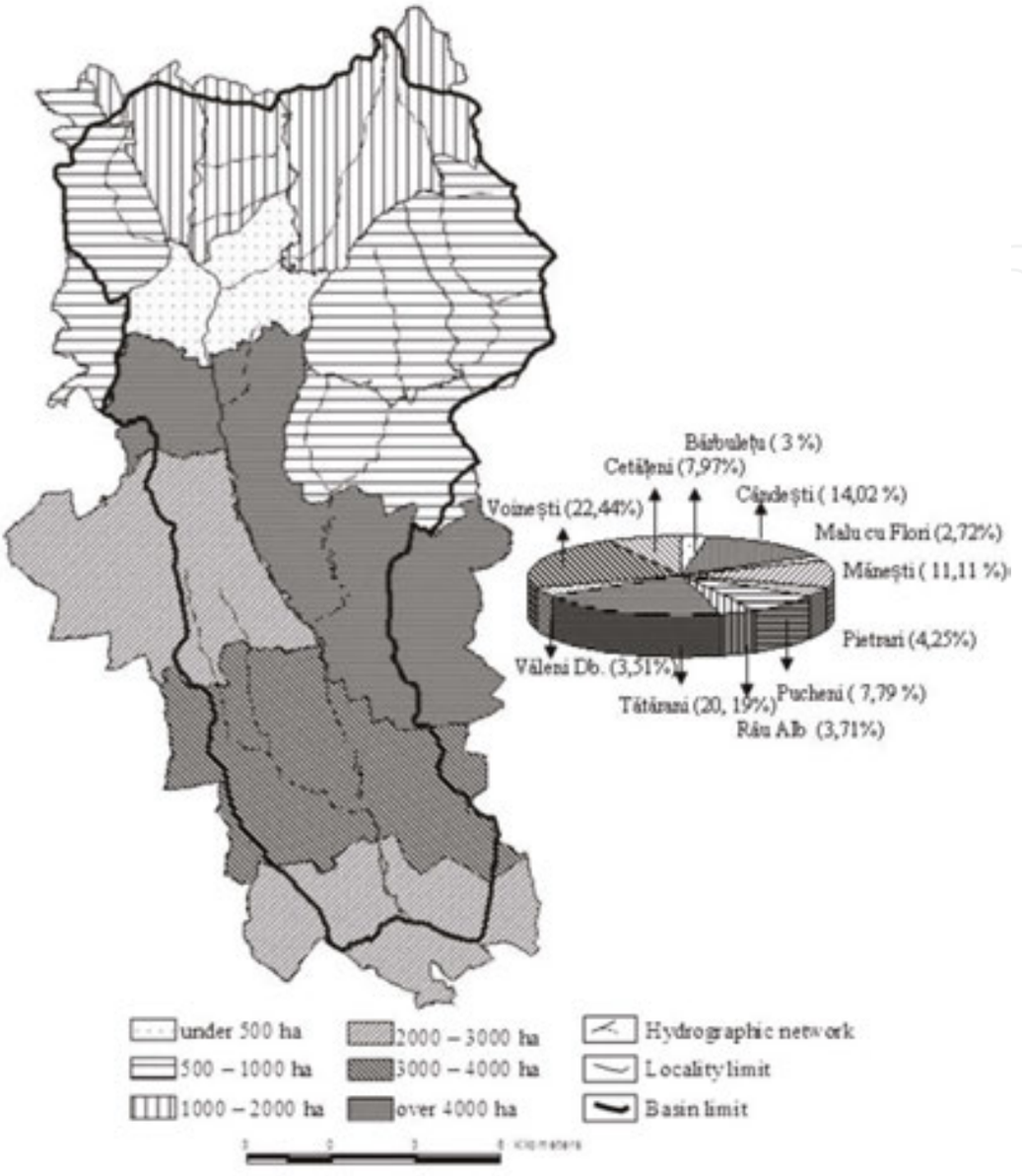

Figure 6. Forest area.

Based on these data, one can appreciate that in the area under analysis, namely the zone of Subcarpathian and Piedmont Basin of Dâmboviţa, forests develop on a significant area, about half of the total area (45.15%); therefore ecological balance is maintained. Yet, anthropic intervention on the forest zones, even though on relatively small areas, is continuous. Main types of pressure, of deterioration and modification of forested areas are: deforestations, both for wood exploitation and for extension of agricultural zones, mainly by orchards; storage of domestic and agricultural waste, especially at the margin of the forests; fires, excessive grazing leading to destruction of young trees and of vegetal cover.

Out of the need to turn to good value of the wood and to enlarge agricultural and constructed areas, in time, important forest zones have been deforested.

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At the present, in the region under analysis, main areas affected by deforestations are those situated at the contact with agricultural zones, especially at the contact with orchards. Here, every year, small areas in the margin of forests are deforested by cutting, by fire or by use of herbicides to increase areas meant for fruit trees. Such practices are encountered in almost entire Subcarpathian and Piedmont Basin of Dâmboviţa, especially in areas of the communes Malu cu Flori, Pietrari, Cândeşti, Bărbuleţu and Voineşti (**Photo 5**).

Photo 5. Deforestations used to extend the areas meant for hayfields and orchards.

Another category of deforestations is that in which wood is exploited to be turned to good value; unlike the deforestations intended for increasing of agricultural area, they take place on larger areas and in the forest zones.

Out of desire to increase fruit tree areas, especially those of apple trees, there have been regions deforested on slopes; this, together with excessive humidity and pedological conditions, has triggered landslides [3]. Such sectors, where geomorphological processes and landslides are more marked, affecting environment and anthropic activities, are present in the localities Bărbuleţu, Pietrari, Râu Alb, and Pucheni (**Photo 6**).

Photo 6. Landslides triggered by the replacement of the forest areas by orchards (Pietrari).

Area of Pietrari Commune situated at the border with Bărbuleţu Commune presents precisely consequences of uncontrolled deforestations and of attempt to replace forest vegetation by fruit trees. Pedological conditions, abundant rains, and incapacity of the fruit trees to retain humidity and to stabilize the soil—compared to forests—have triggered landslides. Such situations can be met as well in the communes Râu Alb, Bărbuleţu, Văleni Dâmboviţa, and Pucheni (**Photo 7**).

Photo 7. Landslides triggered by uncontrolled deforestations.

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Human pressure by waste storage in forest areas. This phenomenon, namely depositing domestic and agricultural wastes in the forest areas does not affect large zones, due to domestic waste collection program [9]. Areas affected by waste storage can be met at the margin of forests and at the contact of latter with a river. Due to the fact that a significant part of domestic wastes are hardly biodegradable, without an intervention meant for cleaning the respective zones, they will continue to affect environment and natural landscape (**Photo 8**).

Photo 8. Waste deposited at the margin of the forests.

Another pressure phenomenon on the forest areas is grazing. Increasingly larger areas of the forest zone are affected by this phenomenon, destroying cover of small vegetation, both by breaking young trees and shrubs and by treading on vegetal cover (**Photo 9**).

Photo 9. Grazing in forest areas.

3.5. Human pressure on the hydrographic network

Regarding human pressure on the hydrographic arteries in Subcarpathian and Piedmont Basin of Dâmboviţa, we have identified two major problems: pollution and increased water consumption following agricultural activities.

Photo 10. Domestic waste stored near the rivers.

Photo 11. Storing the packaging of chemicals waste in the riverside.

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Water pollution represents the alteration of its physic-chemical and biological properties, following direct or indirect human activities, so that water becomes unusable for consumption. Main pollution sources for the hydrographic arteries are depositing on the riverside of domestic and agricultural wastes (**Photo 10**). To these, one can add packaging of chemicals (insecticides, pesticides, fungicides, herbicides) used in the hygienization treatments of plantations; consequently, flora but also fauna are strongly affected (**Photo 11**).

Along the whole riverside of Dâmboviţa and its tributaries situated near orchards and village precincts are stored packages with toxic substances and domestic wastes, affecting the environment and numerous organisms of water environment. The wrong storage also triggers possibility of blocking watercourse, when hydrological regime is increased; consequently, there is a risk of flooding some agricultural areas, houses and roads.

Photo 12. Blockage of the course of Râu Alb rivulet following the storage of domestic wastes on its riverside.

Such a situation was recorded in the year 2012, when following abundant rains, the rivulet Râu Alb increased its flow, and at the passage through Valea Village (Pietrari Commune), because of domestic and agricultural wastes deposited on the wrong way, normal course of water was blocked, flooding agricultural areas, the communal road of Valea Village (Pietrari) and households on the opposite side of protective dam (**Photo 12**). The increasing water quantity needed for agricultural activities, especially for fruit-tree growing, together with high

temperatures of the interval June–August, have led to appearance of drying phenomenon on numerous permanent hydrographic arteries, in certain sectors. Entire area meant for fruit trees —apple trees and pear trees—uses on average about 60,000 tons water/year only for hygienization and maintenance, to which one can add water used in drop by drop irrigation systems, from increasingly numerous superintensive plantations. Excessive grazing in the riverside of Dâmboviţa and of its tributaries constitutes another form of pressure on vegetal cover and young or small trees. This, along with treading of water course margins by animals and agricultural equipments, determines a decreased resistance to water erosion. Riverside of Râu Alb, in between villages Valea Câmpului (Pietrari) and Manga (Voineşti), represents an area in which pressure of excessive grazing, combined with abusive creation of a road used by heavy agricultural equipments, have led to the deterioration and even complete elimination of small trees and of vegetal cover that used to support the right riverside.

4. Conclusions

By using lands according to his needs and interests, man has triggered the dwindling of areas occupied by natural vegetal formations and their replacement by agricultural cultures, secondary vegetal formations or lands that have become unproductive through degradation. On the other hand, anthropic activity has triggered the modification of structure of vegetal cover where natural vegetal formations were maintained. All these have influenced hydrological regime, present relief modeling processes, quality of soil, leading to general modifications in the structure of geographic landscape.

Natural ecosystems are the ones that have been changed little constitute richest resource in point of organisms, biocenoses, environmental conditions, and also numerous relations between organisms and environmental factors, food chain and networks. In the case of natural ecosystems, between the populations of a biocenosis there appear some self-regulation mechanisms, and so organisms that no longer find their ecological niche are obliged to emigrate or disappear.

Super-intensive fruit tree areas exert a much higher pressure on environment, compared to traditional fruit tree areas, through use of large quantities of chemicals, especially in apple tree areas. For just 1 ha of apple trees are used, on average, 20 g insecticide, 40 g fungicide and 1000 l water for a single hygienization treatment.

Using of chemicals affects both flora and fauna of the respective area. A more serious collaboration between fruit growers, and respect for warnings of the specialists based on meteorological conditions could favor diminution of the quantity of chemicals used and decrease of annual water consumption needed to hygienize plantations.

Main types of pressure, impact on and modification of forested areas come from: deforestations, both for using wood and for extending agricultural areas, mainly orchards; domestic and agricultural wastes storage, especially at the margin of forests; fires, excessive grazing, leading to destruction of young trees and of vegetal cover.

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In the area under analysis, zones affected by deforestations are those situated at the contact with agricultural areas, especially at the one with orchards (through cutting, fires or use of herbicides to enlarge areas meant for fruit trees).

Acknowledgements

This material is only the contribution of its authors and it was not published anywhere else.

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References

[1] Bălteanu, D. Semnificaţia geografică a modificării utilizării terenurilor (Geographic significance of land use changes). Bucureşti: AUŞM-Geol.-Geogr. 1996; V: 5-9.

[2] Muică, C. Influenţa modului de utilizare a trenului asupra dinamicii peisajului (Land use influence on landscape dynamics). Bucureşti: Terra. 1991; 2-4.

[3] Muică, C., Sencovici, M. Floristic Diversity and Human Pressure in the Subcarpathians. Bucureşti: Analele Univ. Hyperion (Annals of Hyperion University). 2006; tome IV–V: 57–64.

[4] Bertrand, G. Paysage et la geographie physique globale. Esquisse methodologique. Toulouse: Revue Geographique des Pyrenees et du sud-oust. 1968; 39, 3.

[5] Sencovici, M. Studiul geografic al mediului în câmpia Târgoviştei (A Geographic Study of the Environment in The Plain of Târgovişte). Târgovişte: Editura Transversal; 2010: ISBN 978-606-8042-59-6.

[6] Muică, C., Zăvoianu I. Relationship between the state of plant cover, runoff and erosion processes, in "Vegetation. Land Use and Erosion Processes", Bucureşti: Institutul de Geografie (Institute of Geography). 1999; 88-94.

[7] Dumitraşcu, M. Indici utilizaţi în evaluarea gradului de transformare antropică a peisajelor din Câmpia Olteniei (Indexes Used in the Evaluation of the Anthropic

Transformation Degree of the Landscapes of the Plain of Oltenia). Bucureşti: Revista Geografică (Geographic Review). 2005; XI: 68-73.

[8] Pehoiu, G., Muică, C., Sencovici, M. Geografia mediului cu elemente de ecologie, Târgovişte: Editura Transversal; 2006: ISBN: 978-973-7798-32-9.

[9] Sencovici, M. Vegetal communities in Dâmboviţa County. The Annals of University of Târgovişte; 2009; 10: 43-50.

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